

Remarks

Reconsideration and withdrawal of the objection and rejections set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Claims 1-5 and 7-11 remain pending in the application, with Claims 1 and 11 being independent and having been amended herein.

Claims 1-5 and 7-11 were objected to for minor informalities. Without conceding the propriety of these objections, Claims 1 and 11 have been amended in the manner suggested by the Examiner. Favorable consideration and withdrawal of the objection to the claims are requested.

Claim 11 was rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,923,344 (Norum et al.). Claims 1, 2, 4, 5 and 8-10 were rejected under 35 U.S.C. § 103 as being unpatentable over Norum et al. in view of U.S. Patent No. 6,227,644 (Perner). Claims 1-4 and 7-10 were rejected under § 103 as being unpatentable over Norum et al. in view of U.S. Patent No. 5,448,269 (Beauchamp et al.). These rejections are respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a printing apparatus for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The apparatus includes a carriage, detection means, determining means and control means. The carriage mounts the printing head, and is movable relative to the printing medium in a scanning direction crossing the array of the plurality of printing

elements. The detection means is mounted on the carriage for detecting printing positions of an array of printed pixels corresponding to the array of the plurality of printing elements. The detecting means detects printed pixels printed by any of the plurality of printing elements. The determining means determines all of the printing elements from among the plurality of printing elements that have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of the array of printing elements equal to or greater than a predetermined amount. The control means adjusts drive timing of the plurality of printing elements according to detection results of the detection means so as to make printing positions of subsequently printed pixels close to a predetermined center position. The control means adjusts the drive timing of all of the printing elements determined by the determining means, so that a deviation amount between printing positions of printed pixels corresponding to the one end side and the other end side of the array of printing elements is equal to or smaller than the predetermined amount. All of the printing elements determined by the determining means exclude the one end side of the array of printing elements.

As is recited in independent Claim 11, the present invention relates to a printing method for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The method includes the steps of relatively moving at least one of the printing head and the printing medium in a scanning direction crossing the array of the printing elements so that an array of printed pixels corresponding to the array of the

printing elements is printed on the printing medium, detecting printing positions of the array of printed pixels by detecting printed pixels printed by any of the plurality of printing elements, determining all of the printing elements from among the plurality of printing elements that have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of the array of printing elements equal to or greater than a predetermined amount, and adjusting drive timing of the plurality of printing elements according to detection results of the printing positions so as to make printing positions of subsequently printed pixels close to a predetermined center position. The adjusting step adjusts drive timing of all of the printing elements determined in the determining step, so that a deviation amount between printing positions of printed pixels corresponding to the one end side and the other end side of the array of printing elements is equal to or smaller than the predetermined amount. All of the printing elements determined in the determining step exclude the one end side of the array of printing elements.

Norum et al. relates to a printer that performs pixel alignment of drops. As shown in Fig. 3, in order to form a vertical line in a horizontal pixel region defined between scale lines 66 and 67, the timing for nozzles corresponding to dots outside the horizontal pixel region is adjusted. In this particular example, dots 71-74, 76 and 77 are adjusted. Fig. 4 describes sub-pixel alignment of drops in which dots 72-75 and 77 are additionally aligned by time shifting pulses to generate these dots.

Thus, as understood by Applicants, Norum et al. performs its correcting process on a pixel-by-pixel basis. Although it appears that the position of dot 78 is not

corrected in either the process of Fig. 3 or that of Fig. 4, there is no disclosure or suggestion in Norum et al. that end dot 78 is used as a base mark to determine whether other dots are displaced more than a predetermined amount. If dot 78 were arbitrarily positioned outside the horizontal pixel region defined between scale lines 66 and 67, its position, too, would be corrected.

Accordingly, Norum et al. fails to disclose or suggest at least determining all of printing elements from amount a plurality of printing elements that have displacement amounts of printing positions of corresponding printed pixels from a printing position of a printed pixel corresponding to one end side of an array of printing elements equal to or greater than a predetermined amount, as is recited in independent Claims 1 and 11. Moreover, because Norum et al. does not teach determining displacement amounts from one end side of an array of printing elements, Norum et al. cannot be said to teach that all of such determined printing elements exclude the one end side of the array of printing elements, as is also recited in independent Claims 1 and 11.

Thus, Norum et al. fails to disclose or suggest important features of the present invention recited in independent Claims 1 and 11.

Perner and Beauchamp et al. have also been reviewed, but are not believed to remedy the deficiencies of Norum et al. noted above with respect to independent Claims 1 and 11.

Thus, independent Claims 1 and 11 are patentable over the citations of record. Reconsideration and withdrawal of the §§ 102 and 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1 and 11. Dependent Claims 2-5 and 7-10 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action, and an early Notice of Allowability are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mark A. Williamson", written over a horizontal line.

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